



TRANSMITTAL FORM



06/15/2000

Version: 1.0.0

Application Type: **Utility Patent Filing**



DIRECT CURRENT COMMUTATOR MOTOR

Application No.: **09/575,667**

Attorney Docket No.: **P19613**

First Named Inventor: **Tsuyoshi KONISHI**

I certify that the use of this system is for OFFICIAL correspondence between patent applicants or their representatives and the USPTO. Fraudulent or other use besides the filing of official correspondence by authorized parties is strictly prohibited, and subject to a fine and/or imprisonment under applicable law.

I, the undersigned, certify that I have viewed a display of document(s) being electronically submitted to the United States Patent and Trademark Office, using either the USPTO provided style sheet or software, and that this is the document(s) I intend for initiation or further prosecution of a patent application noted in the submission. This document(s) will become part of the official electronic record at the USPTO.

Email Address: **gbpatent@gbpatent.com**

Attached declaration: **p19613dc.tif**

Attached fee-transmittal: **19613fee.xml**

Attached specification: **P19613.xml**

SUBMITTED BY

Attorney or Agent Name: **Mr. Abraham HERSHKOVITZ**

Electronic Signature Mark: **Abraham HERSHKOVITZ**

Date Signed: **20000615**

Registration Number: 45,294

SPECIFICATION

[Electronic Version 1.0]

Direct Current Commutator Motor

Abstract of the Disclosure

A DC commutator motor that is driven by a direct current power source obtained by rectifying an alternating current power source includes a plus-side brush made of material having a high resistivity and a minus-side brush made of material having a low resistivity. A capacitor is inserted in and connected parallel to the direct current power source. The commutator motor makes use of specials tubes having different shapes to avoid an incorrect insertion of one of the specials tubes into the insertion hole designed to receive the other of the specials tubes.

Direct Current Commutator Motor

Cross-Reference to Related Applications

Not Applicable

Statement Regarding Federally Sponsored Research

Not Applicable

Reference to a Microfiche Appendix

Not Applicable

Background of the Invention

Description of the Prior Art

[p1] The prior art direct current commutator motor that is driven by a direct current power source obtained by rectifying an alternating current power source has a problem in that because a brush electrically connected with a negative pole of the DC power source is susceptible to wear by combustion as a result of collision of cations, no sufficient lifetime can be secured.

[p2] To eliminate the above discussed problem, the Japanese Utility Model Publication No. 54-16242, published June 27, 1979, discloses the use of a standard carbon brush for connection with a positive pole of the DC power source and a metal-mixed graphite brush for connection with a negative pole of the DC power source. The metal-mixed graphite brush is prepared by sintering and molding a mixture of graphite with metallic particles dispersed in the graphite. Since the metallic particles mixed in the graphite have a property less susceptible to wear by combustion as a result of collision of cations, the use of the metal-mixed graphite brush for connection with the negative pole of the DC power source is effective to prolong the service life of the brush.

[p3] With reference to Fig. 6, the prior art direct current commutator motor will be discussed. Referring to Fig. 6 showing the prior art commutator motor partly in a longitudinal sectional representation and partly in a longitudinal side representation, reference numeral 1 represents a frame having a magnet 2 built therein. Reference numeral 3 represents a bracket made of a thermoplastic resin. The bracket 3 has defined therein an insertion hole 3a for receiving a specials tube 10 and a positioning hole 3b extending transverse to the insertion hole 3a and is fixed immovable relative to the frame.

[p4] Reference numeral 4 represents a rotor rotatably supported by bearings carried respectively by the frame 1 and the bracket 3. Reference numeral 7 represents a commutator fixed on a shaft for rotation together with the rotor 4. This commutator 7 is electrically connected with opposite ends of a wire winding of the rotor 4. Reference numeral 8 represents a carbon brush for connection with a positive pole of the direct current power source, which brush 8 is hereinafter referred to as a plus-side brush. This positive brush 8 is slidably accommodated within a plus-side specials tube 10 and is normally biased by a coil spring within the plus-side specials tube 10 so as to slidingly contact the commutator 7.

[p5] Reference numeral 9 represents a metal-mixed graphite brush for connection with a negative pole of the DC power source, which brush 9 is hereinafter referred to as a minus-side brush. In a manner similar to the plus-side brush 8, the minus-side brush 9 is slidably accommodated within a minus-side specials tube 10 and is normally biased by a coil spring within the minus-side specials tube 10 so as to slidingly contact the commutator 7. The plus-side and minus-side specials tubes 10 are of an identical shape and structure and have a spring-like cutout 10a formed therein. The spring-like cutout 10a is capable of being deformed as the specials tube is inserted into the insertion hole 3a to press and deform an inner wall surface of the insertion hole 3a to thereby advance deep into the insertion hole 3a until it is brought into engagement with the positioning hole 3b to thereby

restrain the special tube from being separated out of the insertion hole 3a.

[p6] In this direct current motor of the structure described above, when a direct current voltage obtained by full-wave rectifying an alternating current power source is applied to the brushes through the respective special tubes, the current flows through the wire winding of the rotor by way of the commutator then held in sliding contact with the brushes, developing an electromagnetic force between the wire winding and the magnet 2 to thereby cause the rotor to rotate. At this time, even though the brushes then held in sliding contact with commutator pieces to supply an electric power to the wire winding through the commutator are separated a distance therefrom as a result of rotation of the rotor, the electric current continues to flow therethrough to the wire winding by way of spark discharge developed therebetween, so long as such distance is minute.

[p7] The spark discharge occurs on both plus-side and minus-side and constitutes a cause of wear by combustion of graphite forming the brush, which leads to reduction of the service life. Accordingly, occurrence of the spark discharge should be minimized to secure a sufficient service life of the brush.

[p8] However, considering that the prior art direct current commutator motor makes use of the direct current power source that is obtained by full-wave rectifying the alternating current power source, and that the electric power source is repeatedly turned on and off at a cycle twice the frequency of the alternating current power source, a problem has been found in that the spark discharge occurs frequently, accompanied by an unstable rectification.

[p9] Although to minimize the occurrence of the spark discharge, it is necessary to increase the electric resistance of the brush to a certain extent so that the spark discharge can vanish at a small distance between the brush and the commutator pieces, the metal-mixed graphite brush used as a minus-side brush in the prior art DC commutator motor has

an extremely low resistivity, say, that of 1/100 to 1/1,000 of the resistivity of the standard carbon brush and, therefore, it has been found difficult to increase the electric resistance of the brush.

[p10] The reduction in service life of the brush resulting from the above discussed spark discharge is considerable with increase of the rotational speed of the motor, and the increase of the rotational speed of the prior art DC commutator motor is therefore limited. Also, the prior art DC commutator motor has an additional problem in that since the specials tubes employed respectively for the plus-side and the minus-side are of an identical shape there is a high possibility that they are inserted erroneously into the wrong insertion holes.

[p11] Furthermore, since in the prior art compact DC motor prevention of the specials tubes from being separated is implemented by the engagement between the cutout 10a and the positioning hole 3b, the inner wall surface of the insertion hole has to be pressed and deformed as the respective specials tube is inserted into the insertion hole and, for this purpose the thermoplastic resin is used as a material for the bracket. Accordingly, as compared with the use of the thermoplastic resin, not only is the reliability with respect to heat low, but a dimensional precision is hardly attained and no sufficient physical strength can be attained.

Field of the Invention

[p12] The present invention generally relates to an electric motor and, more particularly, to a direct current commutator motor of a type that can be driven by a direct current power source obtained by rectifying an alternating current power source.

Summary of the Invention

[p13] Accordingly, the present invention has been devised to substantially eliminate the above discussed problems inherent in the prior art direct current commutator motor and is intended to provide an improved direct current commutator motor having a prolonged lifetime and a high reliability and capable of being driven at a high speed.

[p14] To this end, the present invention provides a DC commutator motor that is driven by a direct current power source obtained by rectifying an alternating current power source, wherein a plus-side is made of material having a high resistivity and a minus-side brush is made of material having a low resistivity and, at the same time, a capacitor is inserted in and connected parallel to the direct current power source. This design is effective to provide the DC commutator motor having the brushes of long service life with occurrence of the spark discharge minimized and capable of being driven at a high speed.

[p15] More specifically, the plus-side and minus-side brushes are preferably made of carbon and metal-mixed graphite, respectively. This is particularly advantageous in that the resistance of the minus-brush to the cations can be increased and, at the same time, the occurrence of the spark discharge can be reduced to minimize the possible wear of the brush.

[p16] Plus-side and minus-side specials tubes employed in the practice of the present invention are preferably of a shape differing from each other, so that the possibility of the specials tubes being inserted into the wrong insertion hole can advantageously be avoided. More specifically, the DC commutator motor embodying the present invention makes use of first and second specials tubes made of metal and adapted to slidably receiving respective brushes of different material, and a bracket made of a synthetic resin and having first and second insertion holes defined therein. The first specials tube and the second specials tube can be snugly inserted into the first and second insertion holes, respectively, but the first and second specials tube cannot be inserted into the second and

first insertion holes, respectively. Accordingly, there is no possibility that the specials tubes may be erroneously inserted into the wrong insertion hole during assemblage of the commutator motor.

[p17] Also, in the practice of the present invention, prevention of the specials tubes from being separated is implemented without relying on the spring property, but by the utilization of deformation of a tab. More specifically, each of the specials tubes employed in the commutator motor embodying the present invention has one side face provided with a tab that is divided into first and second tab segments with a cutout intervening therebetween. On the other hand, the corresponding insertion hole has a groove communicated therewith, said groove being of such a shape that when the specials tube is inserted into the insertion hole, the tab can be accommodated loosely therein with a slight gap and, when the specials tube is inserted to a predetermined position inside the insertion hole, only one of the tap segments is exposed to the outside from the insertion hole and is then deformed to bend. Since the inner wall of the insertion hole need not be elastically deformed during the insertion of the corresponding specials tube, a thermosetting resin can advantageously be used as material for the bracket. Therefore, not only is the reliability with respect to heat high, but also a dimensional precision can be attained and a sufficient physical strength can be secured.

Brief Description of the Drawings

[p18] The present invention will become readily understood from the following description of preferred embodiments thereof made with reference to the accompanying drawings, in which like parts are designated by like reference numeral and in which:

[p19] Fig. 1 is a schematic circuit diagram showing a direct current commutator motor including power sources in accordance with a preferred embodiment of the present invention:

[p20] Fig. 2 is a schematic perspective view showing a plus-side specials tube and a corresponding insertion hole according to the present invention;

[p21] Fig. 3 is a schematic perspective view showing a minus-side specials tube and a corresponding insertion hole according to the present invention;

[p22] Fig. 4 is a schematic perspective view showing a condition before the specials tube is inserted into the corresponding insertion hole according to the present invention;

[p23] Fig. 5 is a schematic perspective view showing a condition after the specials tube has been inserted into the corresponding insertion hole and a bendable tab has been bent according to the present invention; and

[p24] Fig. 6 is a schematic longitudinal representation of the prior art direct current commutator motor with upper and lower longitudinal parts shown in sectional and side views respectively.

Description of the Embodiments

[p25] (First Embodiment) Referring to Fig. 1, reference numeral 5 represents an alternating current power source; reference numeral 6 represents a rectifier for full-wave rectifying an output from an alternating current power source and converting it into a pulsating current; reference numeral 8 represents a plus-side carbon brush; reference numeral 9 represents a minus-side metal-mixed graphite brush; and reference numeral 7 represents a commutator slidably engaged with the brushes and operable to selectively switching an electric current to be supplied to a rotor wire winding depending on the angular position thereof. Reference numeral 4 represents a rotor having the rotor wire winding (not shown) mounted therearound and to which an electric power is supplied with the electric current selected from commutator pieces. Reference numeral 2 represents a magnet built in a frame for generating an electromagnetic force in

cooperation with the electric current flowing across the rotor wire winding to provide a magnetic flux for driving the rotor 4.

[p26] In this embodiment, since the minus-side brush is employed in the form of a metal-mixed graphite brush, the electric resistance of this brush is so low that spark discharge is apt to occur. However, a capacitor 11 is connected parallel to the power source to render the intermittent electric current resulting from the pulsating current to be a continuous electric current, thereby suppressing occurrence of the spark discharge.

[p27] (Second Embodiment) Referring now to Figs. 2 and 3, reference numeral 13 represents a plus-side specials tube for receiving the plus-side brush 8; reference numeral 13a represents a first projection provided on the specials tube 13; and reference numeral 13b represents a second projection provided on the specials tube 13 and positioned at a location spaced 90° from the first projection 13a in a counterclockwise direction as viewed from a direction of insertion of the plus-side brush 8. Reference numeral 14 represents a minus-side specials tube for receiving the minus-side brush 9; reference numeral 14a represents a first projection provided on the specials tube 14; and reference numeral 14b represents a second projection provided on the specials tube 14 and positioned at a location spaced 90° from the second projection 14a in a clockwise direction as viewed from a direction of insertion of the minus-side brush 9.

[p28] Reference numeral 12 represents a bracket made of a thermosetting resin, and reference numeral 121 represents an insertion hole defined in the bracket 12 for receiving the plus-side specials tube 13. In order for the plus-side specials tube 13 to be received within the insertion hole 121, first and second recesses 121a and 121b are formed in the bracket 12 in communication with the insertion hole 121 and at respective positions alignable with the first and second projections 13a and 13b on the specials tube 13.

[p29] Reference numeral 122 represents an insertion hole defined in the bracket 12 for receiving the minus-side specials tube 14. In order for the plus-side specials tube 14 to be received within the insertion hole 122, first and second recesses 122a and 122b are formed in the bracket 12 in communication with the insertion hole 122 and at respective positions alignable with the first and second projections 14a and 14b on the specials tube 14.

[p30] According to the second embodiment, the plus-side and minus-side specials tubes 13 and 14 cannot be inserted into the insertion hole 122 and the insertion hole 121, respectively, and, therefore, any possible erroneous insertion the specials tubes into the wrong insertion holes can advantageously be avoided. It is to be noted that except for the respective positions of the second projections 13b and 14b on the respective specials tubes 13 and 14, the specials tubes 13 and 14 are of a substantially identical shape and, therefore, the both can be manufactured using a common mold assembly with a slight modification effected thereto.

[p31] (Third Embodiment) Referring to Figs. 4 and 5, reference numeral 131 represents a specials tube for slidably receiving the brush 8; reference numeral 131a represents a bendable portion of a tab provided on a side surface of the specials tube 131; reference numeral 131b represents a crevice separating the bendable portion 131a from the rest of the tab; reference numeral 12 represents a bracket made of a thermosetting resin; reference numeral 122 represents an insertion hole defined in the bracket 12 for receiving the specials tube 131; and reference numeral 122a represents a longitudinal groove defined in the bracket 12 in communication with the insertion hole 122 for accommodating the tab on the specials tube 131 with a slight gap formed therebetween and so sized and so configured as to permit the bendable portion 131a to be exposed to the outside.

[p32] According to the third embodiment, after the specials tube 131 has been inserted into the insertion hole 122, the bendable portion 131a of the tab on the specials tube 131 is bent in a manner as shown in Fig. 5 so that the specials tube 131 will no longer be separable from the insertion hole 122. This design permits the use of the thermosetting resin as a material for the bracket 122 and, therefore, the bracket 122 having an excellent thermal stability, a dimensional accuracy and an increased physical strength can be obtained. This type of bracket is particularly advantageous where a bearing or the like is fitted.

[p33] Although the present invention has been described in connection with the preferred embodiments thereof with reference to the accompanying drawings, it is to be noted that various changes and modifications are apparent to those skilled in the art. Such changes and modifications are to be understood as included within the scope of the present invention as defined by the appended claims, unless they depart therefrom.

Deposit of Computer Program Listings

Not Applicable

What is Claimed is:

[c1] A direct current commutator motor of a type adapted to be driven by a direct current power source obtained by rectifying an alternating current power source, said motor comprising:

first and second brushes adapted to be electrically connected with plus and minus poles of the direct current power source, the first brush being made of a material having a high resistivity while the second brush is made of a material having a low resistivity;

a commutator having a rotor wire winding, said first and second brushes being slidably engaged with the commutator to supply the electric current to the rotor wire winding; and

a capacitor connected parallel to an output of the direct current power source.

[c2] The direct current commutator motor as claimed in claim 1,

wherein the first brush is a carbon brush and the second brush is a metal-mixed graphite brush.

[c3] A direct current commutator motor which comprises:

first and second specials tubes made of metal and for slidingly receiving first and second brushes of different material, respectively; and
a bracket made of a synthetic resin and having first and second insertion holes for receiving and retaining in position the first and second specials tubes, respectively;

wherein the first and second specials tubes are so shaped relative to the first and second insertion holes that the first specials tube and the second specials tube can be snugly inserted into the first and second insertion holes, respectively, but the first and second specials tube cannot be inserted into the second and first insertion holes, respectively.

[c4] The direct current commutator motor as claimed in Claim 3,

wherein the first specials tube has first and second projections formed thereon with the second projection positioned at a location spaced a first predetermined angle from the first projection as viewed from an opening of the first specials tube, and the first insertion hole for receiving the first specials tube has first and second grooves defined therein at respective locations alignable with the first and second projections on the first specials tube to allow the latter to be inserted into the first insertion hole with the opening of the first specials tube oriented towards the first insertion hole;
wherein the second specials tube has third and fourth projections formed thereon with the fourth projection positioned at a location spaced a second

predetermined angle from the third projection as viewed from an opening of the second specials tube, and the second insertion hole for receiving the second specials tube has third and fourth grooves defined therein at respective locations alignable with the third and fourth projections on the second specials tube to allow the latter to be inserted into the second insertion hole with the opening of the second specials tube oriented towards the second insertion hole; and wherein the first and second predetermined angles are different from each other.

[c5] A direct current commutator motor which comprises:

a bracket made of a thermosetting resin and having insertion holes defined therein;

a specials tube made of metal and adapted to be inserted into and retained in position within a corresponding one of the insertion holes, said specials tube having tab provided on a side face thereof, said tab having a bendable portion left by a crevice defined in the tab; and

a brush slidably accommodated within the specials tube;

wherein the insertion hole has a groove defined therein for receiving the tab on the specials tube when the latter is inserted into and retained in position inside the insertion hole with the bendable portion exposed to the outside, said groove being of a size sufficient to provide a slight gap between it and the tab, said bendable portion being, after the specials tube has been inserted into the insertion hole, being deformed to bend.

Figures

Fig.1

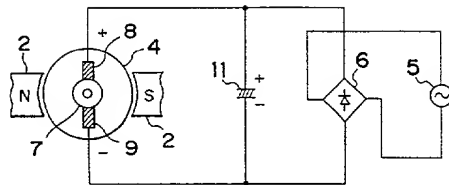


Fig.2

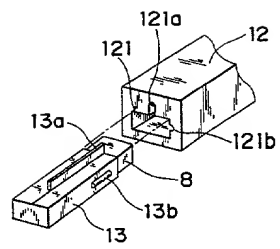


Fig. 3

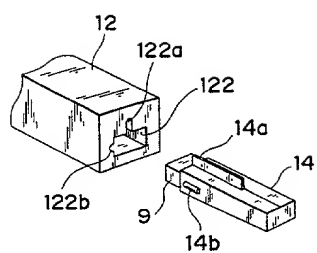


Fig.4

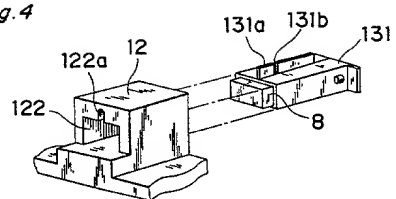
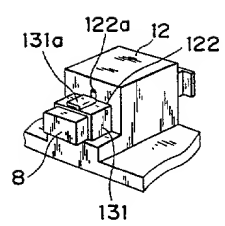
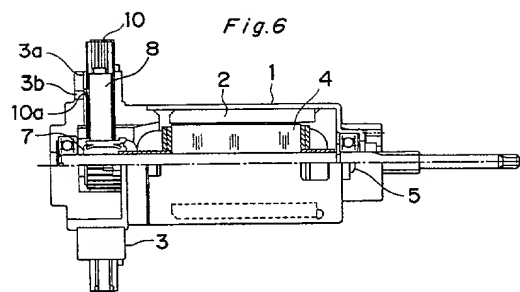


Fig. 5





Declaration and Power of Attorney For Utility or Design Patent Application

特許出願宣言書

Japanese Language Declaration

私は、下欄に氏名を記載した発明者として、以下のとおり
宣言する：

私の住所、郵便の宛先および国籍は、下欄に氏名に続いて記載したとおり
であり、

名称の発明に関し、請求の範囲に記載した特許を求める主題の本来の、
最初にして唯一の発明者である（一人の氏名のみが下欄に記載されている
場合）か、もしくは本来の、最初にして共同の発明者である（複数の氏名が
下欄に記載されている場合）と信じ、

上記発明の明細書（下記の欄でX印がついていない場合は、
本書に添付）は、

☐ 年 月 日に提出され、
米国出願番号 として、
（該当する場合） 年 月 日に訂正されました。又は、

特許協定条約国際出願番号 として、
（該当する場合） 年 月 日に訂正されました。

私は、前記のとおり補正した請求の範囲を含む前記明細書の内容を検討し、
理解したことを陳述する。

私は、連邦規則法典第37編第1条第56項に定義されるとおり、特許資
格の有無について重要な情報を開示すべき義務があることを認めます。

私は合衆国法典第35部第119条(a-d)項又は第365条(b)項に基づく、下
記の外国特許出願又は発明者証出願、或いは第365条(a)項に基づく、少な
くとも米国以外の1ヶ国を指名したPCT国際出願の外国優先権を主張し、
更に優先権の主張に係わる基礎出願の出願日前の出願日を有する外国特許
出願、又は発明者証出願或いはPCT国際出願を以下に“なし”の箱に印を
つけることにより明記する：

Prior foreign applications

先の外国出願

11-170492

JAPAN

17/June/99

(Number)
(番号)

(Country)
(国名)

(Day/Month/Year Filed)
(出願の年月日)

(Number)
(番号)

(Country)
(国名)

(Day/Month/Year Filed)
(出願の年月日)

☐ その他の外国特許出願番号は別紙の追補優先権欄にて記載する。

☐ Additional foreign application numbers are listed on a
supplemental priority sheet attached hereto.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated
below next to my name.

I believe I am the original, first and sole inventor (if only one name is
listed below) or an original, first and joint inventor (if plural names
are listed below) of the subject matter which is claimed and for
which a patent is sought on the invention entitled
Direct Current Commutator Motor

the specification of which is attached hereto unless the following
box is checked:

☐ was filed on として
United States Application Number として
and was amended on (if applicable) or,

PCT International Application Number として
and was amended on (if applicable).

I hereby state that I have reviewed and understand the contents
of the above identified specification, including the claims, as
amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to
patentability as defined in Title 37, Code of Federal Regulations,
§1.56.

I hereby claim foreign priority under Title 35, United States Code
§119(a-d) or §365(b) of any foreign application(s) for patent or
inventor's certificate, or §365(a) of any PCT international application
which designated at least one country other than the United States,
listed below. I have also identified below, by checking the "No"
box, any foreign application for patent or inventor's certificate, or of
any PCT international application having a filing date before that of
the application on which priority is claimed:

Priority claimed

優先権の主張

☒ Yes ☐ No

あり なし

☐ Yes ☐ No

あり なし

Japanese Language Utility or Design Patent Application Declaration

私は、合衆国法典第35部第119条(e)項に基づく、下記の合衆国仮特許出願の利益を主張する。

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

(Application No.) (出願番号)	(Day/Month/Year Filed) 出願の年月日
(Application No.) (出願番号)	(Day/Month/Year Filed) 出願の年月日
(Application No.) (出願番号)	(Day/Month/Year Filed) 出願の年月日

☐ その他の合衆国仮特許出願番号は別紙の追補優先権欄にて記載する。

☐ Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

私は、合衆国法典第35部第120条に基づく下記の合衆国特許出願、又は第365条(c)項に基づく合衆国を指名したPCT国際出願の利益を主張し、本願の請求の範囲各項に記載の主題が合衆国法典第35部第112条第1項規定の態様で、先の合衆国特許出願又はPCT国際出願に開示されていない限度において、先の出願の出願日と本願の国内出願日又はPCT国際出願日の間に有効となった連邦規則法典第37部第1章第56条に記載の特許要件に所要の情報を開示すべき義務を有することを認める。

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

(Application No.) (出願番号)	(Day/Month/Year Filed) (出願の年月日)	(現況) (特許済み、係属中 放棄済み)	(Status) (patented, pending, abandoned)
(Application No.) (出願番号)	(Day/Month/Year Filed) (出願の年月日)	(現況) (特許済み、係属中 放棄済み)	(Status) (patented, pending, abandoned)

☐ その他の合衆国又は国際特許出願番号は別紙の追補優先権欄にて記載する。

☐ Additional U.S. or international application numbers are listed on a supplemental priority sheet attached hereto.

私は、ここに自己の知識にもとずいて行った陳述がすべて真実であり、自己の有する情報および信ずるところに従って行った陳述が真実であると信じ、さらに故意に虚偽の陳述等を行った場合、合衆国法典第18部第1001条により、罰金もしくは禁錮に処せられるか、またはこれらの刑が併科され、またかかる故意による虚偽による陳述が本願ないし本願に対して付与される特許の有効性を損なうことがあることを認識して、以上の陳述を行ったことを宣言する。

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

私、下記署名者は、ここに記載の米国弁護士または代理人に本出願に関し特許商標庁にて取られるいかなる行為に関して、同米国弁護士又は代理人が、私に直接連絡なしに私の外国弁護士或いは法人代表者からの指示を受け取り、それに従うようここに委任する。この指示を出す者が変更の場合には、ここに記載の米国弁護士又は代理人にその旨通知される。

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from either his foreign patent agent or corporate representative, if any, as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

Japanese Language Utility or Design Patent Application Declaration

委任状： 私は、下記発明者として、下記に明記された顧客番号を伴う以下の弁護士又は、代理人をここに選任し、本願の手続きを遂行すること並びにこれに関する一切の行為を特許商標庁に対して行うことを委任する。そして全ての通信はこの顧客番号宛に発送される。

顧客番号 7055

現在選任された弁護士は下記の通りである。

Neil F. Greenblum Reg. No. 28,394
 Bruce H. Bernstein Reg. No. 29,027
 James L. Rowland Reg. No. 32,674
 Arnold Turk Reg. No. 33,094

POWER OF ATTORNEY: As a named inventor, I hereby appoint the attorney(s) and/or agent(s) associated with the Customer Number provided below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, and direct that all correspondence be addressed to that Customer Number:

CUSTOMER NUMBER 7055

The appointed attorneys presently include:

Stephen M. Roylance Reg. No. 31,296
 William E. Lyddane Reg. No. 41,568
 William Pieprz Reg. No. 33,630
 Leslie J. Paperner Reg. No. 33,329

Address: GREENBLUM & BERNSTEIN, P.L.C.

1941 ROLAND CLARKE PLACE
 RESTON, VA 20191

直接電話連絡先：(名称および電話番号)

Direct Telephone Calls to: (name and telephone number)

GREENBLUM & BERNSTEIN, P.L.C.

(703) 716-1191

唯一のまたは第一の発明者の氏名	Full name of sole or first inventor Tsuyoshi KONISHI
同発明者の署名 日付	Inventor's signature Date
住所	Residence Fukui, JAPAN
国籍	Citizenship JAPAN
郵便の宛先	Post Office Address 4-19-1, Hachiman 2-chome Takefu-shi, Fukui-ken JAPAN
第2の共同発明者の氏名 (該当する場合)	Full name of second joint inventor, if any Shiro TATEISHI
同第2共同発明者の署名 日付	Second Inventor's signature Date
住所	Residence Fukui, JAPAN
国籍	Citizenship JAPAN
郵便の宛先	Post Office Address 74-4, Nakagoya, Nanjo-cho Nanjo-gun, Fukui-ken, JAPAN

(第六またはそれ以降の共同発明者に対しても同様な情報および署名を提供すること。)

(Supply similar information and signature for third and subsequent joint inventors.)

Japanese Language Utility or Design Patent Application Declaration

第三の共同発明者の氏名	Full name of third inventor, if any Hiroshi NISHIMURA
共同発明者の署名	Third Inventor's signature
住所	Residence Shiga, JAPAN
国籍	Citizenship JAPAN
郵便の宛先	Post Office Address 271, Kamina, Gamo-cho Gamo-gun, Shiga-ken, JAPAN
第四の共同発明者の氏名	Full name of fourth inventor, if any
共同発明者の署名	Fourth Inventor's signature
住所	Residence
国籍	Citizenship
郵便の宛先	Post Office Address
第五の共同発明者の氏名	Full name of fifth inventor, if any
共同発明者の署名	Fifth Inventor's signature
住所	Residence
国籍	Citizenship
郵便の宛先	Post Office Address
第六の共同発明者の氏名	Full name of sixth inventor, if any
共同発明者の署名	Sixth Inventor's signature
住所	Residence
国籍	Citizenship
郵便の宛先	Post Office Address

(それ以降の共同発明者にたいしても同様な情報
および署名を提供すること。)

(Supply similar information and signature for subsequent joint
inventors.)